Delta Operations for Salmonids and Sturgeon (DOSS) Group
Conference call: 3/29/16 at 9:00 a.m.

Objective: Provide advice to the Water Operations Management Team (WOMT) and National Marine Fisheries Service (NMFS) on measures to reduce adverse effects from Delta operations of the Central Valley Project and the State Water Project on salmonids and green sturgeon. DOSS will work with other technical teams. DOSS notes and advice can be found at: http://www.westcoast.fisheries.noaa.gov/central_valley/water_operations/doss.html.

DWR: Aaron Miller, Rhiannon Mulligan, Kevin Reece, Reza Shahcheraghi, Dan Yamanaka
Reclamation: Josh Israel, Peggy Manza
NMFS: Jeff Stuart, Kristin McCleery
CDFW: Ken Kundargi
SWRCB: Laurel Karren, Brittany Kammerer, Matt Holland,
FWS: Craig Anderson

Agenda Items

1. Agenda review and introductions
2. RPA Implementation review
3. Current Operations
4. Smelt Working Group
5. Fish Monitoring: Salvage
6. Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking
7. Fish Monitoring: RSTs/trawls/seines
8. DOSS Estimates of Fish Distribution and Entrainment Risk
9. DOSS Advice
10. Next DOSS meeting

Agenda Item 2.
RPA Implementation Review

Delta RPA Actions that may affect operations during March and April:

Action IV.1.2[1] (DCC gate operations):

- DCC gates have been closed since 12/15/15.

Action IV.2.3[2] (OMR Flow Management)

- No triggers exceeded over past week.

[1] For details, see pages 62-66 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf
[2] For details, see pages 74-79 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf

- NMFS's RPA Action IV.2.3 limit is currently -5,000 cfs. However, FWS determination on 3/25/16 has an OMR limit of -2,500 cfs for the protection of Delta smelt larvae and is controlling.

Action IV.2.1[3] (I:E ratio)

- Beginning 4/1/16, the San Joaquin inflow at Vernalis to combined CVP/SWP exports is in effect. The San Joaquin basin yeartype based on the March 75% forecast is Critical, which is an inflow-to-export ratio of 1:1. This action restricts combined exports to 100% of Vernalis flow, or 1,500 cfs, whichever is greater)
- The I:E ratio in effect may change if the San Joaquin basin yeartype changes based on the April forecast.

Agenda Item 3.

Current Operations (3/29/16)

SWP		CVP	
Exports (cfs)			
Clifton Court Forebay	1,700*	Jones Pumping Plant	2,000**
Reservoir Releases (cfs)			
Feather - Oroville	4000***	American - Nimbus	5,108****
		Sacramento - Keswick	5,000
		Stanislaus - Goodwin	200
		Trinity - Lewiston	300
Reservoir Storage (in TAF)			
San Luis (SWP)	643	San Luis (CVP)	407
Oroville	3,030	Shasta	5,000
New Melones	200	Folsom	3,000
Delta Operations			
DCC	Closed	Sacramento River at Freeport (cfs)	50,330
Outflow Index (cfs)	~54,330	San Joaquin River at Vernalis (cfs)	1,218
E:I	4.3% (14-day avg.)	X2	<56 km

*SWP plans to decrease inflows into Clifton Court Forebay as the San Joaquin River flow diminishes over the next week and RPA Action IV.2.1 starts on April 1.
** Jones Pumping Plant plans to decrease to 1,000 cfs on 4/1/2016 with the start of RPA action IV.2.1
***Oroville reservoir releases are scheduled to decrease this week to 2,200 cfs on 4/1 and reach 1,050 on 4/7/2016.
****Folsom releases are scheduled to decrease to 3,000 cfs on 4/2/2016.

OMR as of 3/26/16:

[3] For details, see pages 67-70 in Enclosure 2 of the 2011 Amendments to the 2009 RPA document at: http://www.westcoast.fisheries.noaa.gov/publications/Central_Valley/Water%20Operations/Operations,%20Criteria%20and%20Plan/040711_ocap_opinion_2011_amendments.pdf

	USGS gauges (cfs)	Index[4] (cfs)
5-day	-3,660	-3,970
14-day	-4,490	-4,630

The daily OMR Index on 3/28/16 was -3,110 cfs.

Review of factors controlling Delta exports for the period 3/22/16 to 3/29/16:

- *Tuesday (3/22/16):* -5,000 cfs OMR limit per both the NMFS BiOp and the 3/8/16 FWS determination (which continued the -5,000 cfs OMR limit in the 2/10/16 FWS determination).
- *Wednesday* (3/23/16): Transition from -5,000 cfs OMR to -3,500 cfs OMR limit per voluntary reduction by Reclamation and DWR related to concerns for larval Delta smelt and discussions with FWS.
- *Thursday* (3/24/16) through *Saturday* (3/26/16): -3,500 cfs OMR limit per voluntary flow proposal from Reclamation and DWR.
- *Sunday* (3/27/16): Transition from -3,500 cfs OMR limit per voluntary flow proposal from Reclamation and DWR to the -2,500 cfs OMR limit per the 3/25/16 FWS determination.
- *Monday* (3/28/16) and *Tuesday* (3/29/16): -2,500 cfs OMR limit per 3/25/16 FWS determination.

Projected factors controlling Delta exports through 4/4/16

- Wednesday and Thursday (3/30/16 and 3/31/16): -2,500 cfs OMR limit per 3/25/16 FWS determination.
- Friday 4/1/16: NMFS RPA action IV.2.1 begins. Flow schedules for San Joaquin River flows are currently being developed by different agencies and stake holder groups which will influence the level of exports.

Weather forecast indicates chance of precipitation mid-week next week.

Agenda Item 4.

Smelt Working Group

The SWG met on Monday, 3/28/16 at 10am. Bartoo (FWS) provided the following SWG meeting summary via e-mail:

> The Working Group reviewed current Delta Smelt distribution, salvage data, and Delta conditions. The Working Group agreed that the relative risk of entrainment to adult Delta Smelt has increased given current hydrology. As members have previously noted, spawning likely is well underway, and adults are most likely holding their positions,

[4] Beginning 2/16/16, the OMR Index values reported in the DOSS notes were calculated using an OMR Index equation that no longer includes (per the original intent of the index equation) the Contra Costa Water District's Rock Slough diversion in the export term. Beginning February 2016, the OMR Index values reported in the monthly OMR reports on the "CVO Reports" website (http://www.usbr.gov/mp/cvo/index.html) were calculated using this adjusted equation without the Rock Slough diversion.

rather than continuing migration. In light of this, the group's discussions primarily focused on the entrainment risk to larval and juvenile Delta Smelt.

The Working Group described the risk of entrainment under the Service-provided advice framework. Under this framework the relative risk of entrainment for OMR flow ranges is discussed and assessed. For the current week, the risk of entrainment of larval and juvenile Delta Smelt for each of the flow ranges is characterized as follows:

- -1250 to -2000 cfs has a low to medium risk of entrainment,
- -2000 to -3500 cfs has a medium to high risk of entrainment,
- -3500 to -5000 cfs has a high risk of entrainment.

The Working Group is following guidance for entrainment protections from both Action 2 (adult Delta Smelt) and Action 3 (juvenile Delta Smelt). The Working Group will continue to monitor Delta Smelt survey and salvage data and Delta conditions, and will meet again on Monday, April 4, 2016 at 10 am.

SWG meeting notes are available at: http://www.fws.gov/sfbaydelta/cvp-swp/smelt_working_group.cfm.

Agenda Item 5.
Fish Monitoring: Salvage[5]

Fujimura (CDFW) provided the following summaries of salvage and loss at the SWP and CVP fish collection facilities. The salvage figures were generated on the CDFW salvage monitoring web-page: http://www.dfg.ca.gov/delta/apps/salvage/SalvageExportCalendar.aspx.

[5] Salvage data reported in this section represent the total estimated and expanded salvage based on the number of fish observed at the fish collection facility. For example, if one steelhead is observed in the typical ½-hour sampling period within a 2-hour operation period, the single steelhead is expanded to a salvage of four.

DOSS Weekly Salvage Update

Reporting Period: March 21-March 27, 2016

Prepared by Bob Fujimura on March 28, 2016 15:28

Preliminary Results -Subject to Revision

Criteria	21-Mar	22-Mar	23-Mar	24-Mar	25-Mar	26-Mar	27-Mar	Trend	
Loss Densities									
Wild older juvenile CS	0.22	0.23	0	0	0	0	0	↗	0.06
Wild steelhead	0	0	0	0	1.33	1.06	0	↘	0.34
Exports									
SWP daily export	6,551	5,942	5,341	3,967	3,673	3,276	2,637	↘	4,484
CVP daily export	6,757	6,769	5,437	4,889	4,892	4,890	4,891	↘	5,504
SWP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%
CVP reduced counts	0%	0%	0%	0%	0%	0%	0%	→	0%

Loss Density = fish lost/TAF; water export = AF; Trend = compared to previous week; wild = adipose fin present

Loss = estimated number of fish lost at the CVP and SWP Delta export facilities based on estimated salvage (see below)

Reduced counts = percentage of time that routine salvage sample time were less than 30 min per 2 hours of salvage and export operations

Yellow highlighted date indicate a facility salvage outage occurred

Chinook Salmon Weekly/Season Salvage and Loss

Combined salvage and loss for both CVP and SWP fish facilities

Race determined by size at date of capture; hatchery = adipose fin missing;

		Weekly Total			Season Total	
Category		Salvage	Loss	Trend	Salvage	Loss
Wild						
	Winter Run	8	6	↗	36	56
	Spring Run	22	65	↗	66	93
	Late Fall Run	0	0	→	44	166
	Fall Run	14	16	↗	82	92
	Unclassified	0	0	→	14	NC
	Total	**44**	**87**		**242**	**408**
Hatchery						
	Winter Run	0	0	↘	209	610
	Spring Run	572	479	↗	580	484
	Late Fall Run	0	0	→	93	298
	Fall Run	4	3	↗	5	7
	Unclassified	0	0	→	0	0
	Total	**576**	**482**		**887**	**1,399**

Trend = weekly loss per race; Salvage = estimated number of fish collected by the CVP and SWP fish protective facilities per unit of time

NC = can not be calculated

Steelhead Weekly/Season Salvage and Loss

Combined salvage and loss for both CVP and SWP fish facilities

	Weekly Total			Season Total	
Category	Salvage	Loss	Trend	Salvage	Loss
Wild	8	20	↘	94	203
Hatchery	124	391	↘	1,252	3,384
Total	**132**	**411**		**1,346**	**3,587**

State Water Project loss = salvage x 4.33; Central Valley Project loss = salvage x 0.68

Figure 1. DOSS weekly salvage update for the reporting period 3/21/16-3/27/16.

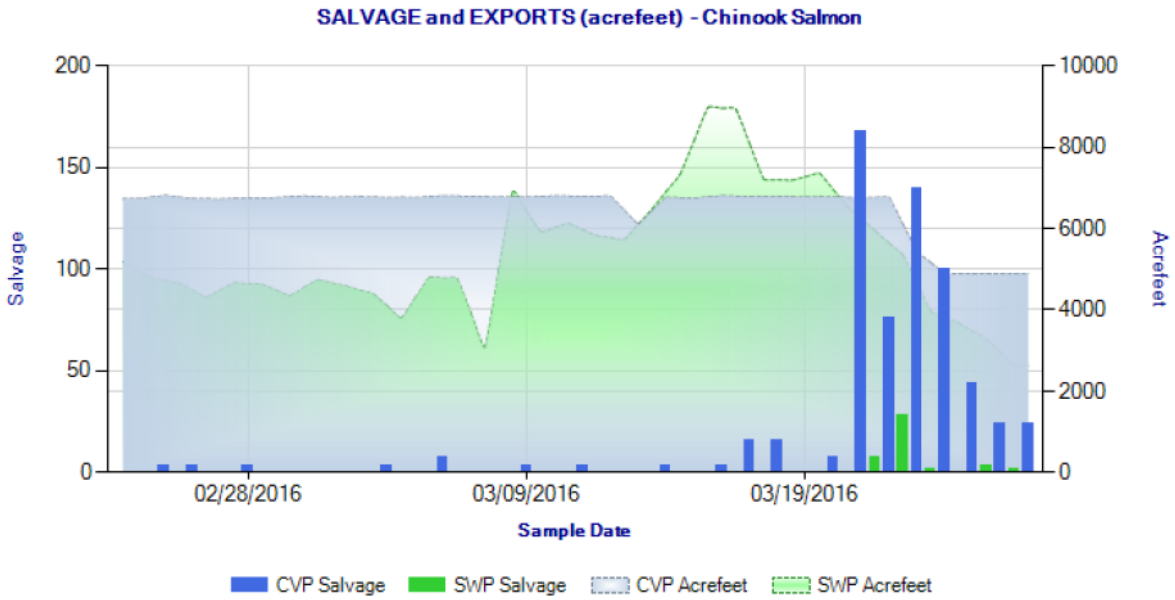


Figure 2. Daily salvage of Chinook salmon (all races) and water exports from the state and federal fish salvage facilities during February 24, 2016 through March 27, 2016.

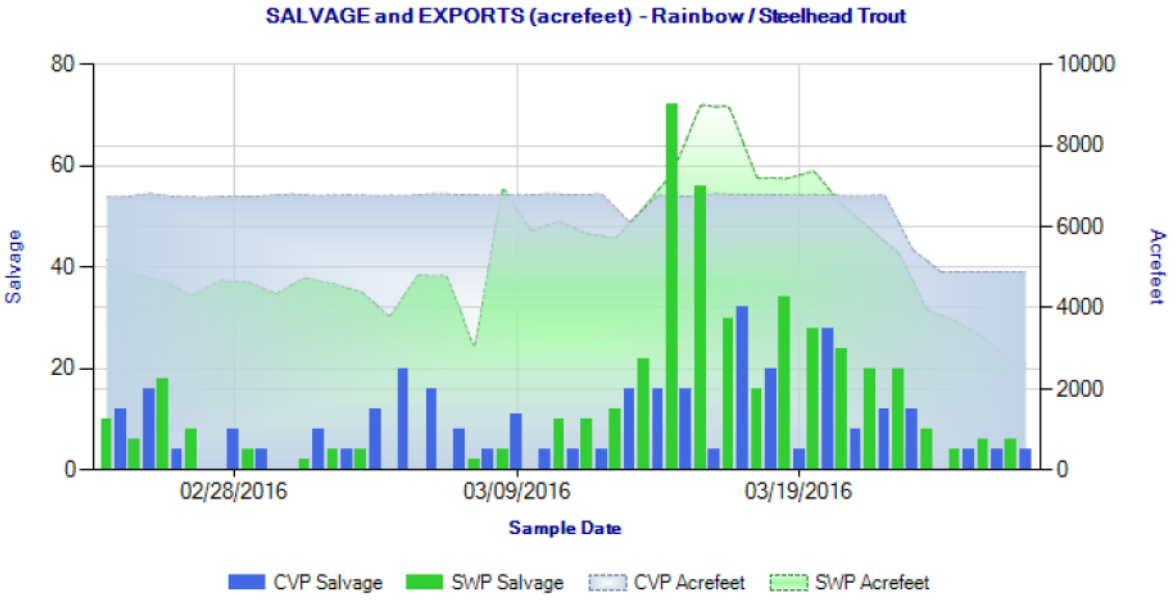


Figure 3. Daily salvage of steelhead and water exports from the state and federal fish salvage facilities during February 24, 2016 through March 27, 2016.

Preliminary salvage report for Monday, 3/28/16:

- Clipped Chinook salmon were observed at both fish collection facilities.
- Unclipped Chinook salmon were observed at the SWP facilities.
- Clipped steelhead were observed at both facilities.

Outages at both fish facilities were scheduled for Tuesday, 3/29/16.

Coded-wire-tag recoveries

Mulligan (DWR) provided the following summary of coded-wire-tag recoveries at the SWP and CVP fish collection facilities. The cumulative loss of the hatchery winter-run Chinook group [released by Livingston Stone National Fish Hatchery (LSNFH) on 2/17/16 to 2/18/16] is 11.19, 0.003% of the number released. The most recent salvage of LSNFH hatchery winter-run Chinook occurred on Monday, 3/14/16. The cumulative loss of the third spring-run Chinook surrogate group (released from Coleman National Fish Hatchery on 1/12/16) continues to hold at 0.412%, near the 0.5% OMR trigger threshold under Action IV.2.3. Loss of Chinook within any spring-run Chinook surrogate group has not occurred since 2/12/16. Several hundred spring-run Chinook salmon from the San Joaquin River Restoration Program releases have been recovered at both facilities.

CONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

Release Date	CWT Race	Hatchery	Release Site	Release Type	Confirmed Loss	Number Released[1]	Total Entering Delta	% Loss of Number Released[2]	% Loss of Total Entering Delta[3]	First Concern Level	Second Concern Level	Date of First Loss[4]	Date of Last Loss[4]
6/11/2015 to 6/12/2015	LF	Coleman NFH	Balls Ferry Boat Ramp, Sacramento River	Production	0.00	434,227	n/a	0.000	n/a	n/a	n/a	*	*
12/9/2015	LF	Coleman NFH	Battle Creek	Production	305.22	261,213	n/a	0.117	n/a	n/a	n/a	12/25/2015	2/12/2016
12/11/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	128.05	77,000	n/a	0.166	n/a	0.5%	1.0%	12/25/2015	1/21/2016
12/22/2015	LF	Coleman NFH	Battle Creek	Spring Surrogate	170.59	68,000	n/a	0.251	n/a	0.5%	1.0%	1/6/2016	2/2/2016
1/12/2016	LF	Coleman NFH	Battle Creek	Spring Surrogate	278.65	67,700	n/a	0.412	n/a	0.5%	1.0%	1/20/2016	2/12/2016
2/17/2016 to 2/18/2016	W	Livingstone NFH	Sacramento River	Winter Run Production	11.19	420,006	155400	0.003	0.00720	0.5%	1.0%	3/6/2016	3/14/2016
3/14/2016	F	Coleman NFH	Battle Creek	Fall run Production	0.00	864,486	n/a	0.000	n/a	n/a	n/a	*	*
3/18/2016	S	Feather River Hatchery	San Joaquin River	River restoration program	303.88	105,000	n/a	0.289	n/a	n/a	n/a	3/20/2016	3/23/2016
3/22/2016	F	Coleman NFH	Battle Creek	Fall run Production	0.00	1,373,815	n/a	0.000	n/a	n/a	n/a	*	*
2/1/2016	F	Coleman NFH	Yolo bypass inundated Rice fields at Knaggs Ranch	special study	0.00	6,145	n/a	0.000	n/a	n/a	n/a	*	*
3/1/2016	F	Feather River Hatchery	Yolo bypass at Toe drain and Sacramento river at Elkhorn	special study	0.00	94,000	n/a	0.000	n/a	n/a	n/a	*	*

UNCONFIRMED HATCHERY (ADIPOSE-FIN CLIPPED) CHINOOK SALMON LOSS AT THE SWP & CVP DELTA FISH FACILITIES, 2015/2016

Facility	Unknown CWT Loss[5]	Unread CWT Loss[8]	Unknown Hatchery Loss[7]	Acoustic Tag Loss[8]	Number of Unassigned CWTs[9]
SWP	35.30	0.00	0.00	0.00	0
CVP	7.95	0.00	0.00	0.00	0
TOTAL	43.25	0.00	0.00	0.00	0

SWP and CVP adipose-fin clipped Chinook lost from 10/1/2015 through 6/21/2016.

[1]Number released with the adipose-fin clipped and a coded-wire tag (CWT).

[2]% Loss of Number Released = (Confirmed Loss/Number Released)*100.

[3]% Loss of Total Entering Delta= (Confirmed Loss/Total Entering Delta)*100.

[4]Date of first and last loss accounts for all CWT loss even those from special studies where salvage and loss=0.

[5]Adipose-fin clipped Chinook was observed during fish count, but tag code could not be determined (e.g., damaged tag, lost tag, no tag, or Chinook released).

[6]Adipose-fin clipped Chinook was collected during fish count and has not been processed yet.

[7]CWT has been read, but hatchery release information not yet available.

[8]Adipose-fin clipped Chinook released due to presence of sutures.

[9]CWT cannot currently be assigned to a salvage record with certainty since the CWT was lost and then found. CWT may be assigned to a salvage record if new information is available.

[10]Chinook outside of the length-at-date criteria (Delta model) are not reported.

** Information not yet available.

DWR-DES Revised 3/29/2016

Preliminary data from DFW, DWR, FWS, and Reclamation; subject to revision.

Agenda Item 6.
Fish Monitoring: Hatchery winter-run Chinook acoustic-tracking

LSNFH released approximately 420,000 hatchery winter-run Chinook at Bonnyview Bridge in Redding – one group on 2/17/16 and the other group on 2/18/16. 285 of each release group (for a total of 570) were acoustic-tagged with JSATS tags and NOAA's Southwest Fisheries Science Center (SWFSC) is tracking movement of these acoustic-tagged fish past eight "real-time" receiver locations from Redding to Middle River.

Highlights from the latest (as of 9:00 am on 3/28/16) acoustic-tracking data from Arnold Amman (SWFSC) are provided below.

- Using the mark-recapture model with the latest data, the estimated survival and detection probability suggests that survival from Redding to Colusa was 72.6% (68.7-76.1% CI), which would be highest in the last 4 years.

- 49% of the acoustic-tagged hatchery winter-run Chinook have passed the Tower Bridge receiver in Sacramento.
- One fish was detected on 3/21/16 that had spent 26 days at large between Verona and the Tower Bridge since its last detection. No additional fish have been detected since 3/21/16.
- The update on 3/28/16 may be the last update of this year, unless there are new detections.

Agenda Item 7.
Fish Monitoring: RSTs/trawls/seines

The following table presents fish monitoring data. Unless otherwise noted, reported sizes are fork length. See also:
http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm.

Location	Chipps Is. Midwater Trawl[A, E]	Station 902/Jersey Pt./Prisoners Pt. Trawls[A]	Sacramento Trawl[A]	Beach Seines[A]	Knights Landing RST[B]	Tisdale RST[C]	GCID RST[D]	Mossdale Kodiak Trawl[A]
Sample Date	3/25	902: 3/23 Jersey Pt: 3/22 Pris. Pt: 3/21, 3/25	3/21, 3/25	3/22, 3/24, 3/25	3/21-3/28	3/21-3/28	No sampling since 3/4	3/21, 3/24, 3/25
FR Chinook	1	19	32	145	252	74		
WR Chinook	2		3					
SR Chinook	3		4	6	11	104		
LFR Chinook								

Ad-Clipped Chinook			1	2	13	18		17
Chinook Adult								
Steelhead (wild)	1				1			
Steelhead (ad-clip)		1			1			
Green Sturgeon								
Delta Smelt		1		1				
Splittail			1					
Longfin Smelt								
Flows (avg. cfs)					24,357	28,823		
W. Temp. (avg. °F)					54.6	55.1		
Turbidity (avg. NTU)					50.9	42.3		

[A] Data reported in the 3/20 to 3/26 DJFMP sampling summary
[B] Sampling period was from 3/21 at 10:00 am to 3/28 at 10:15 am.
[C] Sampling period was from 3/21 at 9:00 am to 3/28 at 9:45 am. Cones were modified to 50% catch throughout sampling period.
[D] On 3/4 at 9:00 am, the GCID trap was pulled from the bypass channel to avoid the expected peak in high flows and heavy debris.
[E] Normally there are 3 days of sampling at Chipps Island, this week only 1 day of sampling occurred.

Monitoring Summary for DCC and Early Warning surveys: This table provides recent monitoring information not included in the 3/20 to 3/26 DJFMP sampling summary and thus not captured in the table above.

Location	**Prisoners Pt. Trawls**	**Sacramento Trawl**
Sample Date	3/28	3/28
FR Chinook	1	27
WR Chinook		
SR Chinook		9
Ad-Clipped Chinook		20
Delta Smelt		

Red Bluff Diversion Dam (RBDD) Monitoring

USFWS biweekly report (3/11/16-3/24/16) for preliminary estimates of passage by brood-year and run for unmarked juvenile Chinook salmon captured by rotary screw traps at RBDD included:

Run and Species	Biweekly Total	Brood Year Total
Winter-run Chinook (BY2015)	1,775	336,451

Agenda Item 8.

DOSS Estimates of Fish Distribution and Entrainment Risk

DOSS estimates of the current distribution of listed Chinook, as a percentage of the population, are based on recent monitoring data and historical migration timing patterns. As monitoring information is received, listed species distribution will be updated and included in the following table.

Location	Yet to Enter Delta (Upstream of Knights Landing)	In the Delta	Exited the Delta (Past Chipps Island)
Young-of-year (YOY) winter-run Chinook salmon[1]	<1% (Last week: same)	35% - 55% (Last week: 50% - 70%)	45% - 65% (Last week: 30% - 50%)
*Young-of-year (YOY) spring-run Chinook salmon**	<5% (Last week: 5% - 10%)	40% - 50% (Last week: 55% - 60%)	45% - 55% (Last week: 30% - 40%)
Hatchery winter-run Chinook salmon	<5% (Last week: same)	30% - 50% (Last week: 45% - 65%)	45% - 65% (Last week: 30% - 50%)

*Once hatchery fall-run releases (75% of which are unmarked) occur upstream of a monitoring location, DOSS assumes that many of the unclipped spring-run-sized Chinook observed in monitoring may be unmarked fall-run Chinook that fall into the spring-run size range. Because Coleman National Fish Hatchery released 864,400 BY 2015 fall-run Chinook into Battle Creek on 3/14/16, and another 1,374,000 BY 2016 fall-run Chinook on 3/22/16, this assumption is now relevant.

Rationale for changes in distribution

Wild winter-run Chinook: The fraction of wild winter-run upstream of the Delta stayed the same since DOSS thinks a few stragglers may still remain upstream, but that this fraction is very small relative to the entire population. The increase in the fraction of wild winter-run having exited the Delta is based on the continued high flows on the Sacramento River and seasonal timing (historical peak winter-run outmigration from the Delta is in March), both of which DOSS considers conducive to winter-run outmigration. While just two winter-run-sized wild Chinook were reported in the Chipps Trawl, low trawl efficiency and a low winter-run population may mean that the Chipps trawl may not collect many winter-run this year, even during peak outmigration. Also, sampling at Chipps Island occurred just once last week rather than the usual three times. The decrease in the fraction of wild winter-run remaining in the Delta was due to DOSS's estimate that many more winter-run exited the Delta than entered.

Wild spring-run Chinook: The fraction of wild spring-run upstream of the Delta decreased based on (a) wild spring-run-sized Chinook upstream of the Delta continued to be observed during Sacramento River monitoring upstream of the Delta last week (note that some of these may be unmarked hatchery fall-run Chinook; see footnote to fish distribution table), and (b) high flows

(conducive to salmonid movement) continued this week. The increase in the fraction of wild spring-run having exited the Delta is based on the high flows continuing to move some fish out of the Delta. Several spring-run-sized wild Chinook were reported in the Chipps Trawl. The decrease in the fraction of wild spring-run remaining in the Delta was due to DOSS's estimate that more spring-run exited the Delta than entered from upstream.

Hatchery winter-run Chinook: The fraction of hatchery winter-run upstream of the Delta stayed the same based on the very few acoustic-tagged hatchery winter-run Chinook detected passing the Tower Bridge receivers in the last week, despite still-high flows (conducive to salmonid movement). The increase in the fraction of wild winter-run having exited the Delta is based on the continued high Sacramento River flows and seasonal timing (peak winter-run outmigration from the Delta is in March), both of which DOSS considers conducive to winter-run outmigration. The decrease in the fraction of hatchery winter-run in the Delta was due to DOSS's estimate that more winter-run exited the Delta than entered from upstream.

DOSS Feedback on Entrainment Risk

DOSS provides weekly entrainment risk outlooks by considering (a) two different categories of entrainment risk based on listed fish distribution and (b) factors that influence their potential for entrainment. The two entrainment risk categories considered include:

- **Interior Delta Entrainment Risk**- fish in the Sacramento River that have the potential to be entrained into the Interior Delta through the Delta Cross Channel (when open) and/or Georgiana Slough; and
- **CVP/SWP Facilities Entrainment Risk**- fish in the Interior Delta that have the potential to be entrained into the CVP/SWP facilities.

Influencing factors considered include:

- **Exposure Risk** (both categories)- estimated scale (low, medium, high) of fish anticipated to be in vicinity of an entrainment risk,
- **Routing Risk** (Interior Delta Entrainment Risk)- estimated scale (low, medium, high) that flow split conditions could result in fish migrating into the interior delta instead of remaining in main channel, and
- **OMR/Export Risk** (CVP/SWP Facilities Entrainment Risk)- for fish in the Interior Delta, estimated scale (low, medium, high) that OMR and/or Export levels could result in entrainment associated with CVP/SWP facilities.

To provide an overall assessment of entrainment risk, the estimated current status of these influencing factors are described below for each of the entrainment risk categories.

Interior Delta Entrainment Risk for listed salmonids in the Sacramento River over the next week:

- **Exposure Risk:** LOW *(last week: MEDIUM)*
  - Flow and turbidities from recent rains, cues for salmonid movement, are decreasing, and more fish are likely to have moved downstream to the western Delta past the channel divergences to the Delta interior that are of concern.
- **Routing Risk:** LOW *(last week: same)*

    - Continued high river flows are expected to mute the tidal effects at Georgiana Slough (reducing the risk of routing into Georgiana Slough) for those fish remaining upstream of this divergence.
- **Overall Entrainment Risk:** LOW *(last week: LOW TO MEDIUM)*

CVP/SWP Facilities Entrainment Risk for listed salmonids in the Interior Delta over the next week:

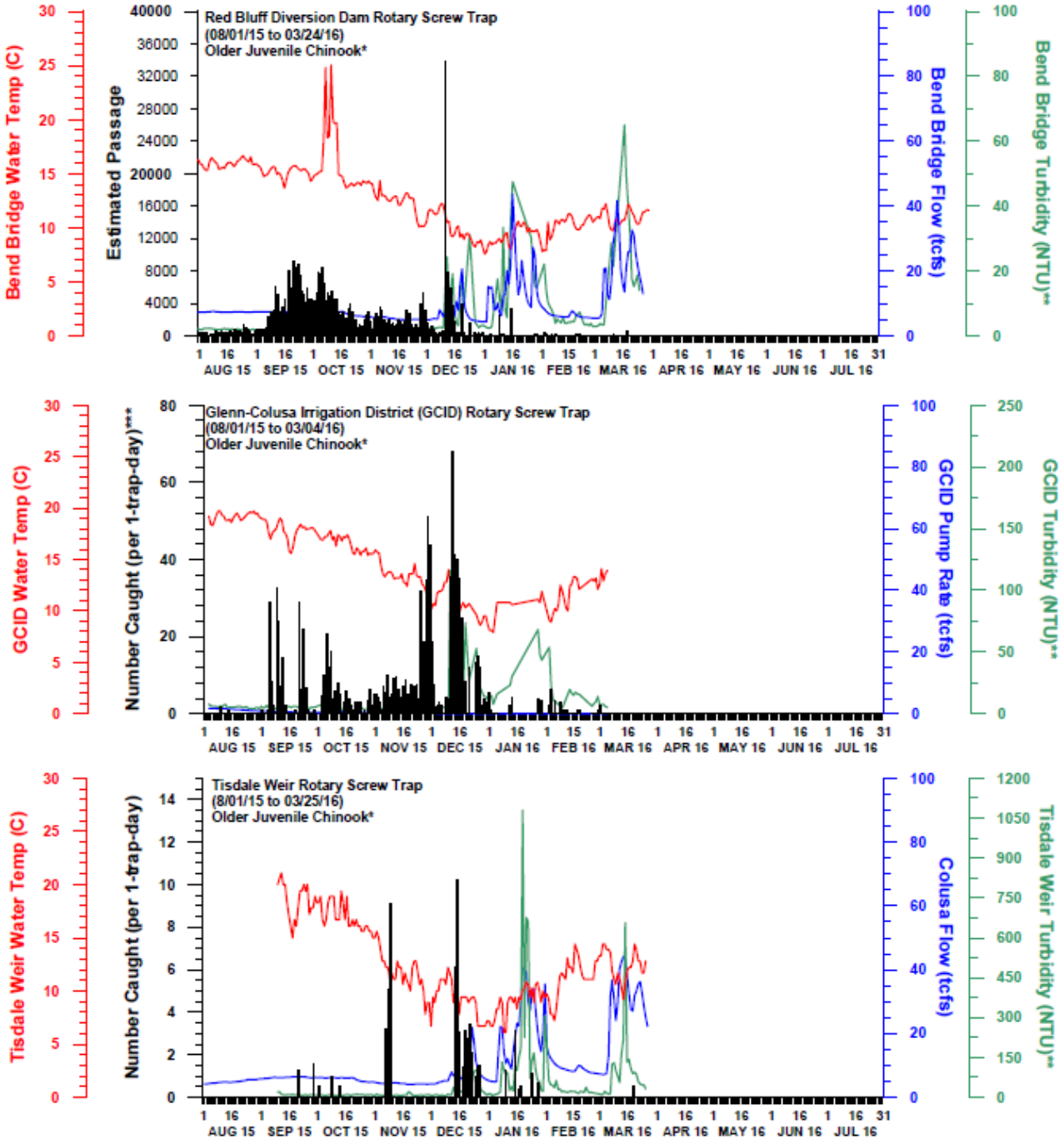
- **Exposure Risk:** LOW TO MEDIUM *(last week: MEDIUM to HIGH)*
- **OMR/Export Risk:**
    - OMR -2,500 cfs to -3,500 cfs: LOW *(last week: same)*
    - OMR -3,500 cfs to -5,000 cfs: MEDIUM *(last week: same)*
- **Overall Entrainment Risk:**
    - OMR -2,500 cfs to -3,500 cfs: LOW *(last week: LOW to MEDIUM)*
    - OMR -3,500 cfs to -5,000 cfs: MEDIUM *(last week: same)*

Agenda Item 9.
DOSS Advice to WOMT and NMFS: None

Agenda Item 10.
Next Meeting: The next DOSS conference call will be on 4/5/16 at 9am.

The following graphs were provided by DWR for Chinook salmon and steelhead observed at monitoring locations in the Sacramento and San Joaquin rivers and Delta. Also available at: http://www.water.ca.gov/swp/operationscontrol/calfed/calfedmonitoring.cfm

NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE SACRAMENTO RIVER

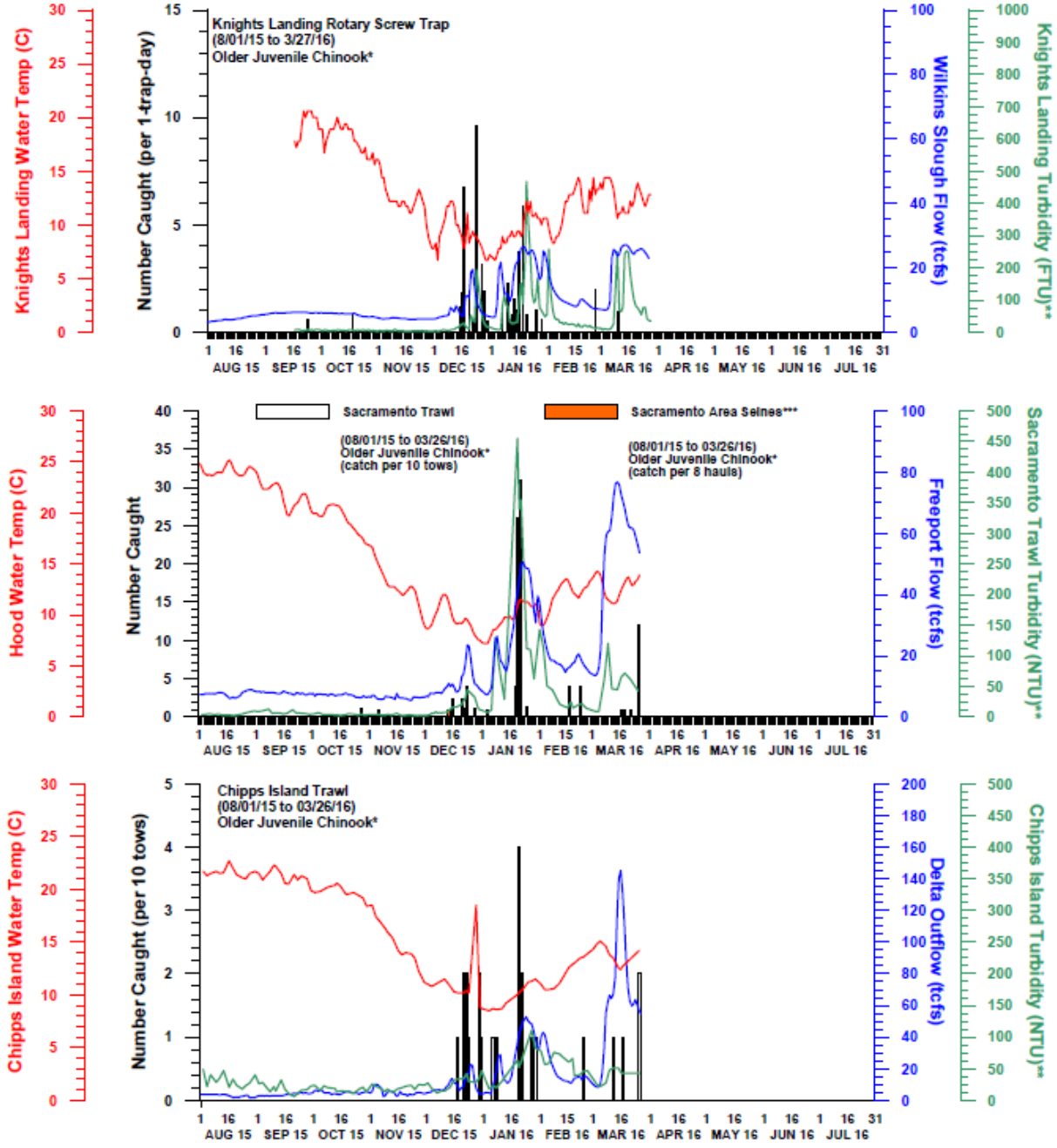


DWR-DES 29 MARCH 2016
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher model) for which a race is assigned on a given sampling date.

-Tisdale: 12/12/2015-12/13/2015 there was a river right revolution malfunction.

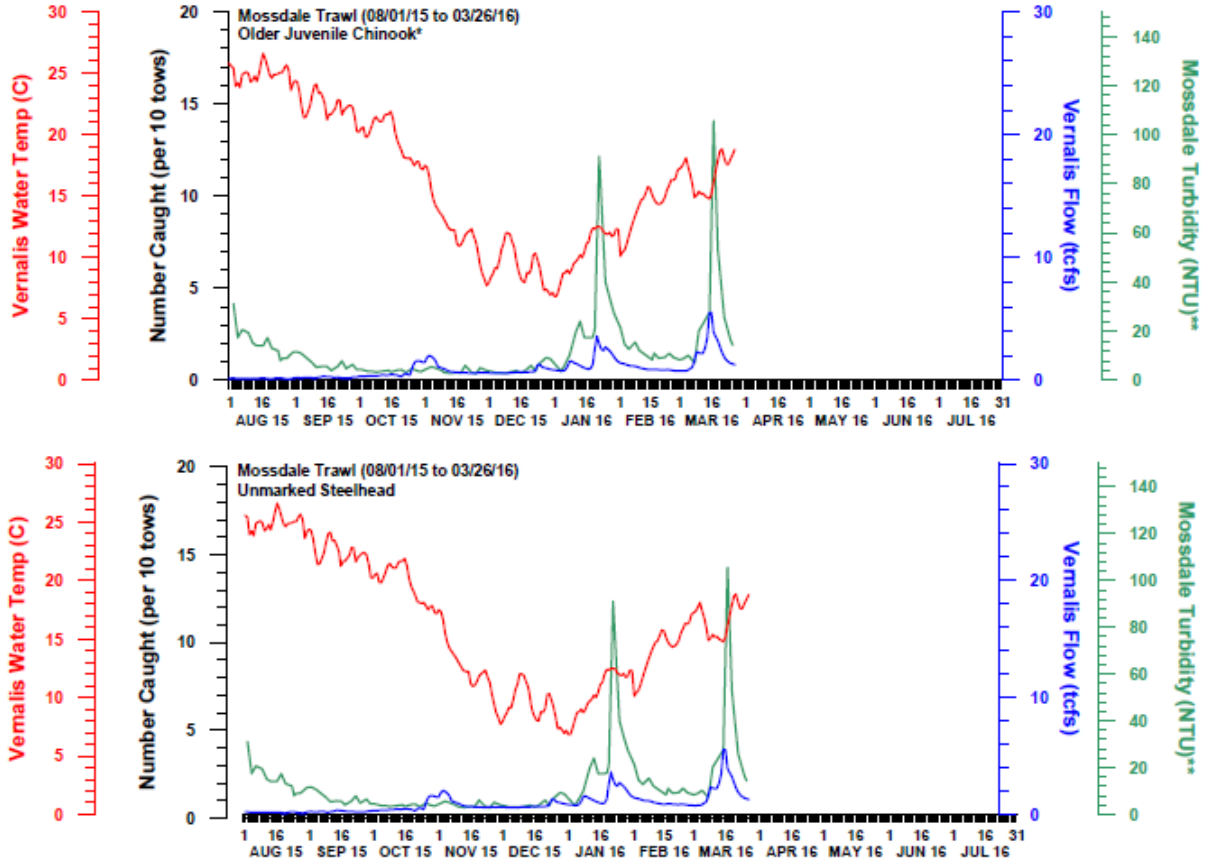
NUMBER OF UNMARKED OLDER JUVENILE CHINOOK MEASURED IN THE LOWER SACRAMENTO RIVER AND CHIPPS ISLAND



DWR-DES 29 MARCH 2016
Preliminary data from DFW, FWS, and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher Model) for which a race is assigned on a given sampling date.
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days. Knights Landing turbidity measured in FTU, which should be roughly equivalent to NTU.
***Sacramento area seine route consists of the following seine sites: Verona, Elkhorn, Sand Cove, Discovery Park, American River, Miller Park, Sherwood Harbor, and Garcia Bend. Bars are stacked if Chinook caught from the trawl and seines are from the same day.

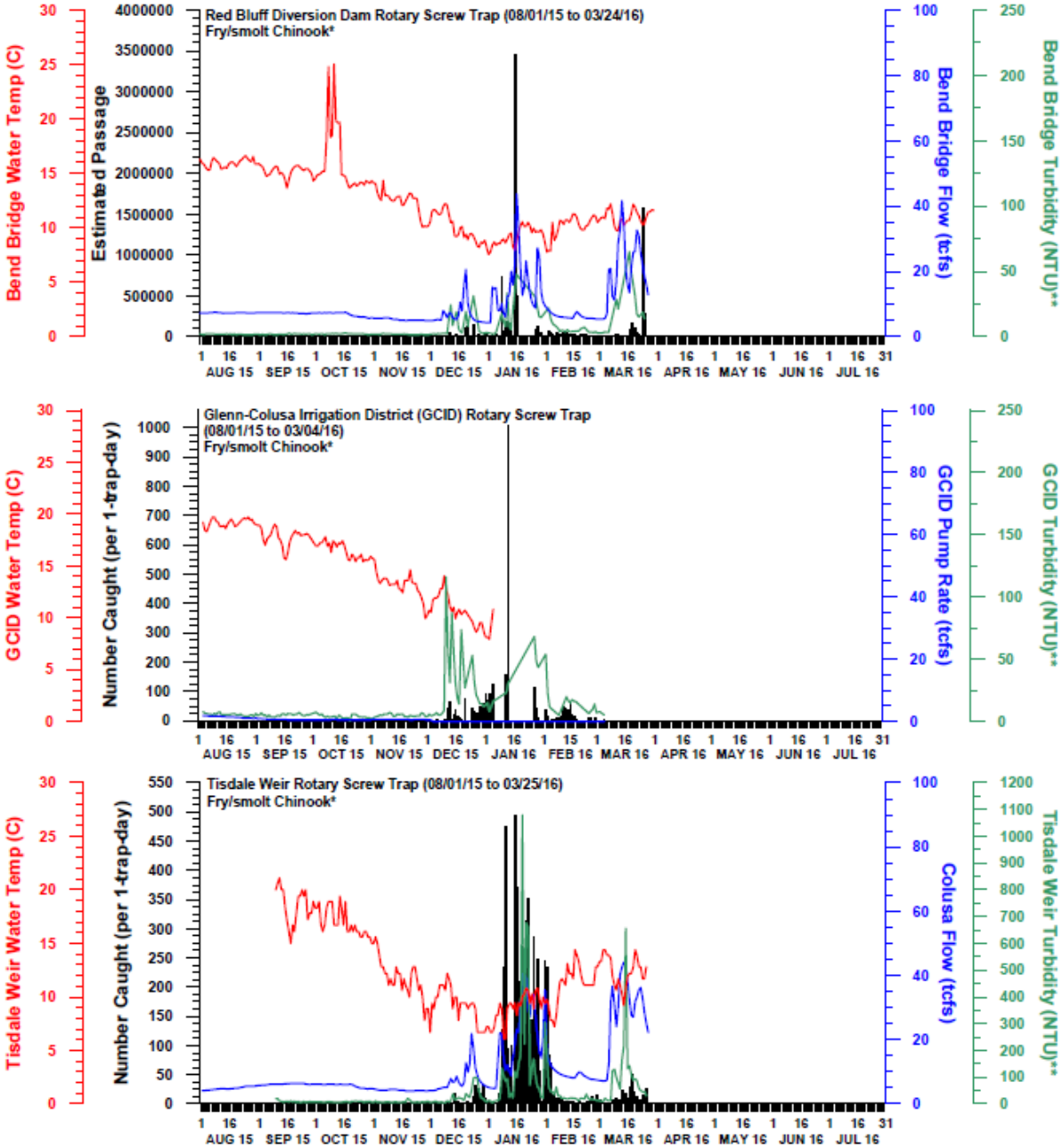
NUMBER OF UNMARKED OLDER JUVENILE CHINOOK AND STEELHEAD MEASURED IN THE SAN JOAQUIN RIVER



DWR-DES 29 MARCH 2016
Preliminary data from FWS and CDEC; subject to revision.

*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Frank Fisher model) for which a race is assigned on a given sampling date.
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

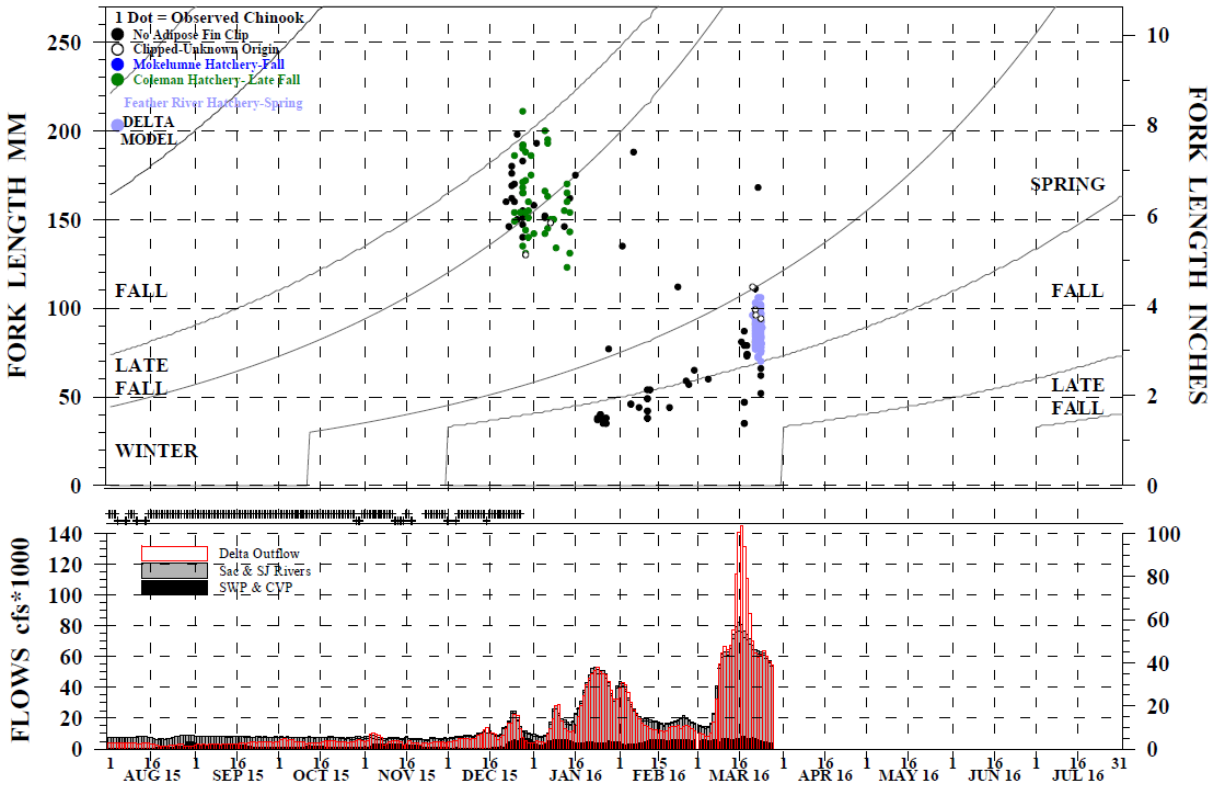
NUMBER OF UNMARKED FRY/SMOLT CHINOOK MEASURED IN THE SACRAMENTO RIVER



DWR-DES 29 March 2016
Preliminary data from DFW, FWS, GCID, and CDEC; subject to revision.

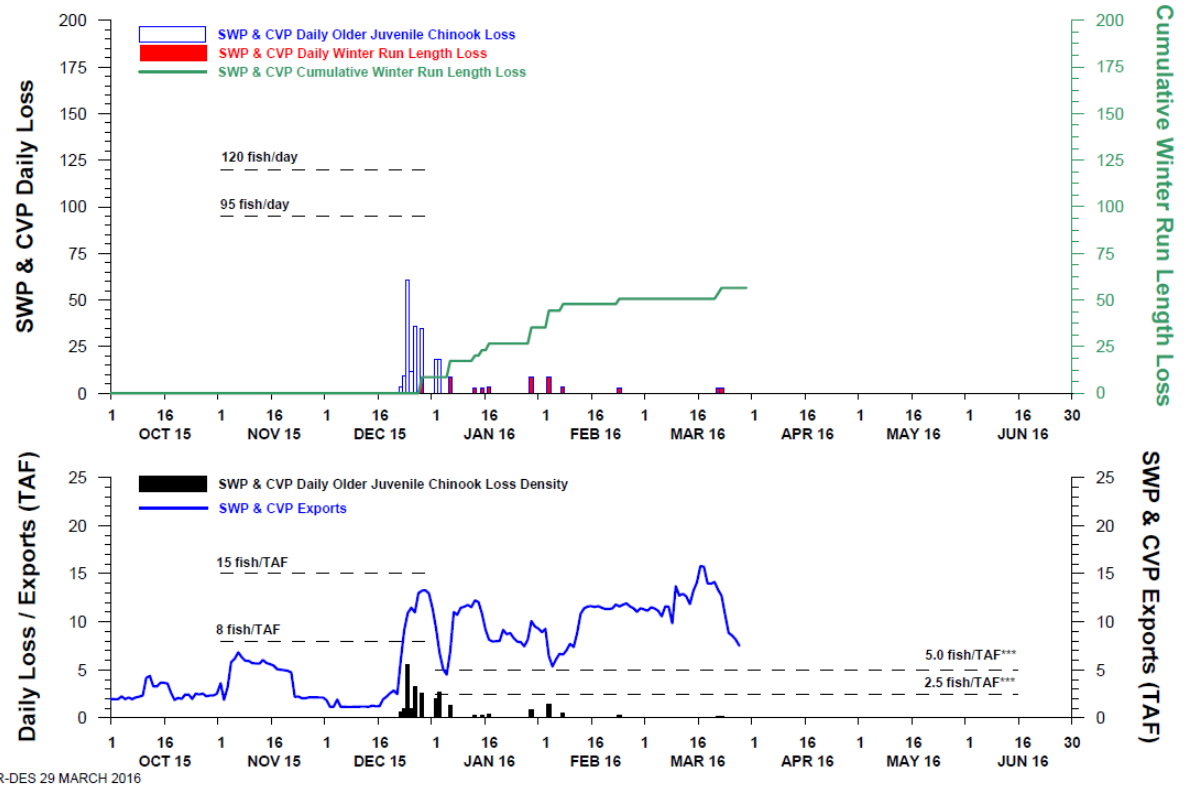
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Frank Fisher model).
**Turbidity is a discrete measurement and is not measured continuously. Therefore, data are interpolated on days when turbidity was not measured unless data are missing for more than five days.

OBSERVED CHINOOK SALVAGE AT THE SWP & CVP DELTA FISH FACILITIES 08/01/2015 THROUGH 03/28/2016



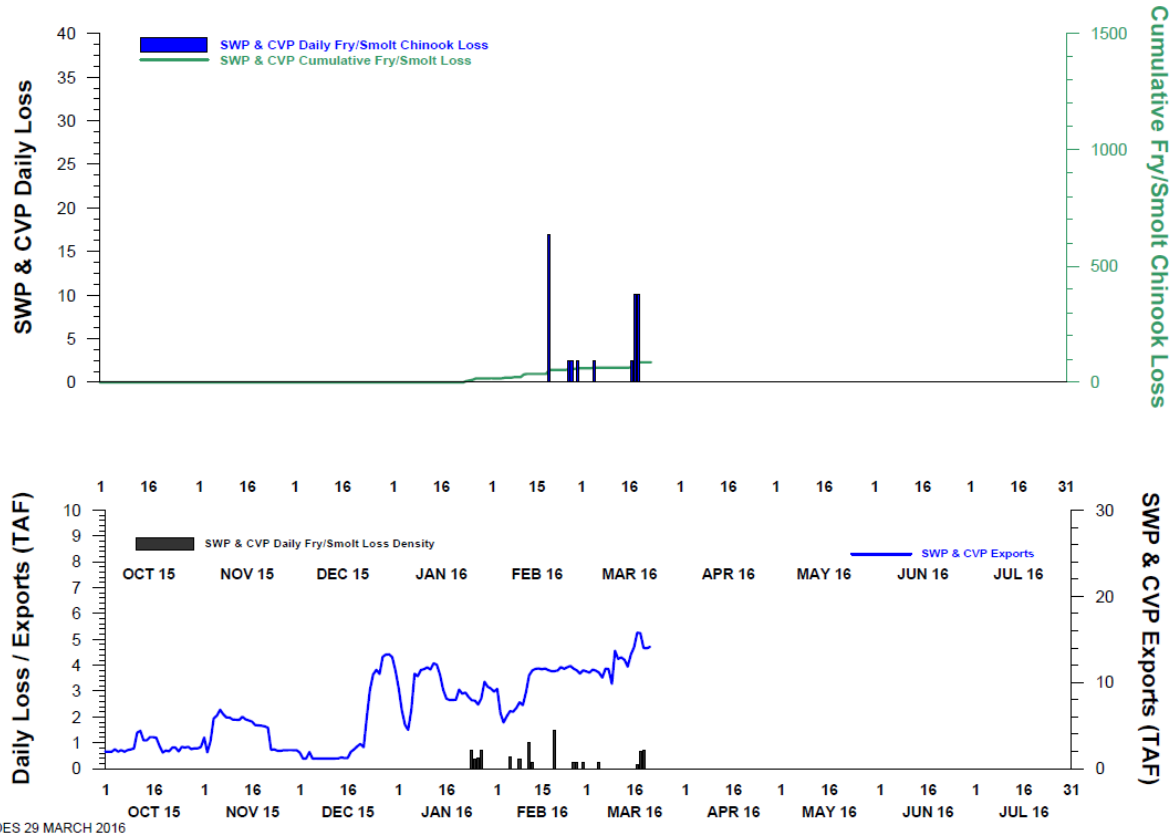
DWR-DES 29 MARCH 2016
Preliminary data from DFW, DWR, FWS, Reclamation, and CDEC; subject to revision.
*Chinook not measured for length and Chinook outside of the length-at-date criteria (Delta model) are not reported.

NON-CLIPPED WINTER RUN & OLDER JUVENILE CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 28 MARCH 2016



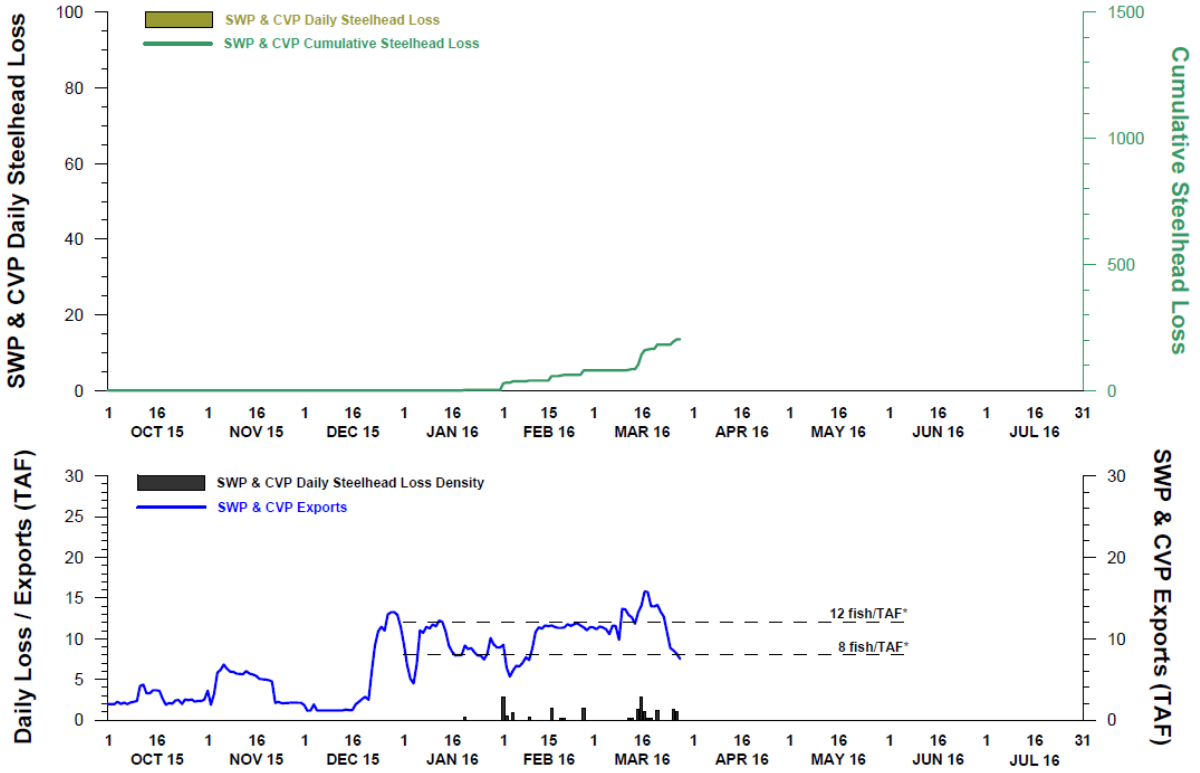
DWR-DES 29 MARCH 2016
Preliminary data from DFW; subject to revision.
*Older juvenile Chinook defined as all Chinook greater than or equal to the minimum winter run length-at-date criteria and less than the maximum size included in the length-at-date criteria (Delta model) for which a race is assigned on a given sampling date.
**ITL(Incidental Take Limit) is based on the JPE, which is not yet available.
***minimum value determined by NMFS

NON-CLIPPED FRY/SMOLT CHINOOK LOSS AT THE DELTA FISH FACILITIES 01 OCT 2014 THROUGH 28 MARCH 2016



DWR-DES 29 MARCH 2016
Preliminary data from DFW; subject to revision.
*Fry/smolt Chinook defined as all Chinook less than the minimum winter run length-at-date criteria (Delta model).

NON-CLIPPED STEELHEAD LOSS AT THE DELTA FISH FACILITIES 01 OCT 2015 THROUGH 27 MARCH 2016



DWR-DES 29 March 2016
Preliminary data from DFW; subject to revision.
*Used to roughly estimate whether the daily loss is greater than 8 fish/TAF multiplied by the volume exported in TAF or 12 fish/TAF multiplied by the volume exported in TAF.